



**A STUDY TO EVALUATE THE PRESCRIPTION PATTERN OF ANTIBIOTIC IN  
PEADIATRIC WARD OF A TERTIARY CARE HOSPITAL**

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**ABSTRACT**

**Aim:** Study of prescribing pattern of antibiotics in peadiatric of a tertiary care hospital. This study were conducted to assess the patterns of antibiotics and to suggest necessary modifications in prescribing practices to achieve rational therapeutic practices. **Method:** A prospective and observational study were carried out at the 1000 bedded SMI Multispecialty Hospital, Dehradun, (Uttarakhand) from August 2015 to September 2015. The demographic data, disease data and the utilization of different classes of antibiotics as well as individual drugs were analyzed using descriptive analysis. **Results:** A total of 100 patients were enrolled in the study. Out of 89 patients included for the study, 65 (61.2%) were males and 24(38.8%) were females, Out all patients 2 patients had an age of 0-28 days, 28 patients were the age of 28-2 years, 31 patients were the age of 3-11 years, 40 patients were the age of 12-18 years. Included for study, 75(84.27%) patients were prescribed Cephalosporin's, 17(19.11%) patients were prescribed with Penicillins, Followed by 14 (15.73%) patients were prescribed Nitroimidazole, 5(5.61%)patients were prescribed Fluoroquinolones, 13(14.60%) patients were prescribed aminoglycosides, 12(13.48%) patients were prescribed other antibiotics and 5(5.61%) patients were prescribed macrolide. **Conclusion:** The present study on antibiotics drug prescribing patterns in medical peadiatric unit can provide a framework for continuous prescription audit in the Peadiatric unit. Overall extensive poly-pharmacy and poly-pharmacy among antimicrobial agents were noticed.

**KEYWORDS:** Drug utilization, Antibiotics, peadiatric unit, Polypharmacy.

**INTRODUCTION**

Antibiotics are chemotherapeutic agents that have revolutionized the treatment of infectious disease turning life-threatening diseases into more manageable and treatable conditions. In addition to treating community-acquired infections, antibiotics have facilitated and improved the safety and outcomes of surgery and transplantation in hospitals and other health-care settings.<sup>[1]</sup> Antibiotics are substances that inhibit the growth of microorganisms or kill them. These agents are produced wholly or partially from microorganisms to inhibit the growth or affect the growth by killing other species of microorganism.<sup>[2,3]</sup> Antibiotics are defined according to their mechanism for targeting and identifying microorganisms – broad-spectrum antibiotics are active against a wide range of microorganisms; narrow-spectrum antibiotics target a specific group of microorganisms by interfering with the metabolic process specific to those particular organisms. The history of antibiotics begun in 1932 when the first sulfonamide<sup>[4]</sup> was prepared. The boom of sulfonamides appeared thereafter with about 5.000 substances developed during years 1932-1945. Sulfonamides were

effective in urinary tract infections, shigellosis, and pneumococcal pneumonia and even in purulent meningitis. But the effect of sulfonamides was totally exceeded with penicillin and streptomycin. It was a happy chance that these two antibiotics covered the whole spectrum of bacteria.<sup>[5]</sup> At the end of the 19th century and the beginning of the early 20th century, scientists began the search for new antibacterial agents for the treatment of infectious diseases. In particular, two groundbreaking events in the 1930s and 1940s catalyzed the microbial drug era – Alexander Fleming's discovery of penicillin and Selman Waksman's discovery of streptomycin.<sup>[6]</sup> S.A. Waksman introduced the term "antibiotic" in 1942.<sup>[7]</sup> A new study has related that 53 per cent Indians take antibiotics without a doctor's prescription and up to 48 percent want to change their physician, if not prescribed. A major problem of self medication with antimicrobials is the emergence of resistance against human pathogens. Antimicrobial resistance is a current problem world-wide particularly in developing countries, where antibiotics are often available without prescription.<sup>[8]</sup> Antibiotic drug resistance can be intrinsic or acquired, develops due to

irrational use of antibiotics. Developing new antibiotics is not a solution for this, It is the responsibility of the healthcare team to develop a good prescribing pattern which will help in reducing the intensity of the problem. And most of the alternatives, i.e. second and third line agents are becoming ineffective in clinical practice.<sup>[9]</sup> antibiotics for something as simple as a common cold. According to a preliminary study conducted by the World Health Organization (WHO), 16 per cent physicians prescribe antibiotics to patients with non-specific fever. The Global Antibiotic Resistance Partnership (GARP) -India research estimates 190, 000 neonatal deaths each year due to infections, of which over 30 percent are attributable to antibiotic resistance.<sup>[10]</sup> The overuse and inappropriate use of antibiotic has led to antibiotic resistance during the last decades, antibiotics resistance is on the rise.<sup>[11]</sup> this is mainly due to the abuse of broad-spectrum antibiotics in the first line treatment, or erroneous use (e.g. treatment of viral respiration tract infection), use of multiple courses (e.g. cystic fibroses patients)or prolonged duration of antibiotic treatment.<sup>[12]</sup>

According to WHO the rational use of drugs is the use of the right drug, right dosage at the right cost. Irrational prescribing is a global problem, Inappropriate prescribing habits lead to ineffective and unsafe treatment, exacerbation or prolongation of illness, distress and harm to the patient, and higher costs.<sup>[13]</sup>

**METHOD**

An observational and retrospective study were carried out for two months during August – November 2015 in the pediatric departments of SMI hospital (100 case) In-patients Department. All patients admitted to the paediatric unit during the study period were included as the study population. Permission to collect the data and accompany physicians on ward rounds in the paediatric unit were taken from the head of general paediatric before starting the study. The relevant data were collected while accompanying the clinicians 6 days in a week and also from the inpatient medical records. We have reviewed all the prescriptions and the detail were collected during that particular hospital stay. To evaluate the drug prescribing pattern a specially designed Performa containing relevant details such as demographics (age, sex and outcome of the patient), clinical data (Clinical diagnosis and associated co-morbid conditions), and drug data was used. Drugs prescribed (generic/brand name), dosage, route, frequency of administration were collected as per Performa.

**Statistical analysis**

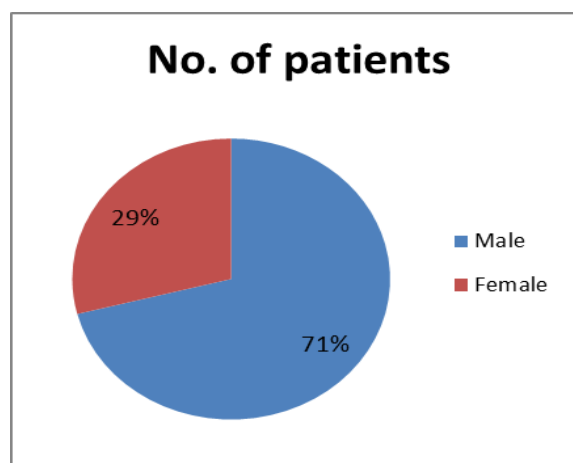
The data were subjected to descriptive analysis using Microsoft Excel. Drugs were classified into different groups based on WHO-ATC classification. Utilization of different classes of drugs as well as individual drugs were analyzed and presented as percentage.

**RESULT AND DISCUSSION**

Total 100 prescriptions were investigated during the study period from Pediatric departments of SMI hospital in-patients having antibiotic in prescriptions. In our study, patients were divided into three groups based on different age. A total of 100 patients were enrolled in the study. Out of 100, 89 patients received antibiotics included for the study, 65(73.1%) were males and 24(26.9%) were females find in [Table no.-01,02].

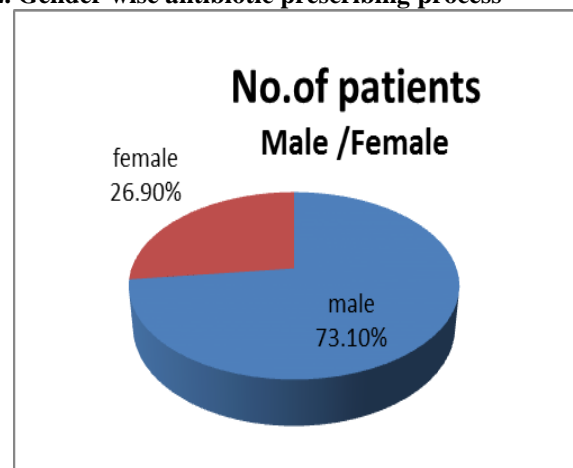
**Table no: 01: Gender Categorization**

Gender	No. of patients	Percentage
Male	71	71%
Female	29	29%
Total	100	100%



**Fig-01: gender wise distribution of patient**

**2. Gender wise antibiotic prescribing process**

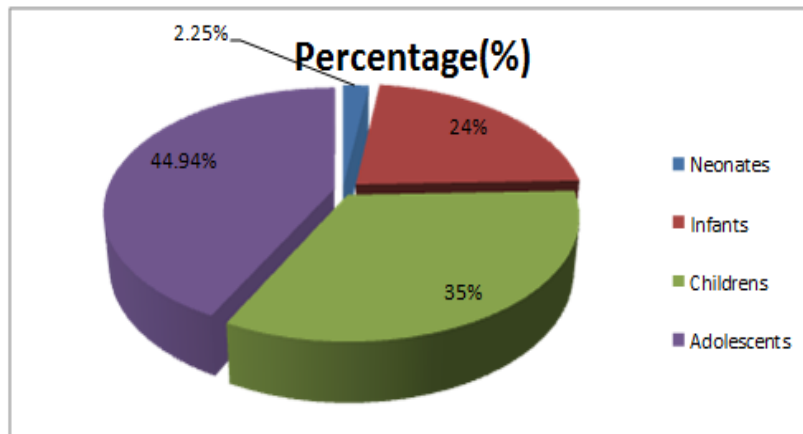


**Fig: 02 Gender wise distribution of Antibiotics prescribed to the patients**

**Table: 02 Gender wise distribution of patients who were having antibiotic prescription**

Gender	No. of patients prescribed antibiotics	Percentage (%)
Male	65	73.1%
Female	24	26.9
Total	89	100%

Out all patients 2 patients had an age of 0-28 days, 28 patients had an age of 28-2 years, 31 patients had an age of 3-11 years, 40 patients had an age of 12-18 years. (Table No-03).

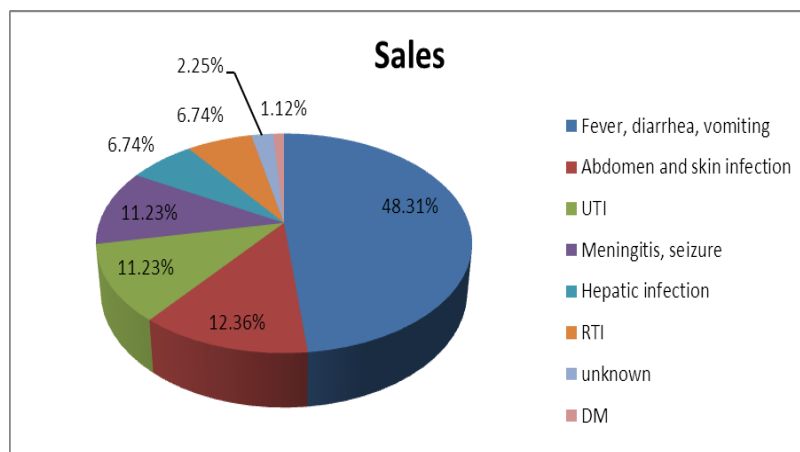


**Fig-03- Age group wise distribution of antibiotic medication order of patients**

**Table no. 03: Age group wise distribution of antibiotic medication order of patients**

S.No.	Age	Number of medication order	Percentage (%)
1.	Neonates(0-28days)	2	1.41%
2.	Infants(28days-2years)	21	7.06%
3.	Children(3-11years)	31	15.90%
4.	Adolescents(12-18years)	40	16.25%

The common reason for admission in general surgery ward is 43(48.31%) patients were Fever, diarrhea, vomiting, 11(12.36%) patients were Abdomen and skin infection, 10(11.23%) patients were Urinary tract infection, 10(11.23%) patients were Meningitis and seizure, 6(6.74%) patients were Viral hepatitis liver, 6(6.74%) were Respiratory tract infection, 2(2.25%) patients were unknown and 1(1.12%) patients were Diabetic Mellitus. (Table no: 04).



**Fig-no: 04 Disease Pattern Reported**

**Table No: 04 Disease Pattern Reported**

Diagnosis	No of Patients	Percentage of Patients
Fever, diarrhea, vomiting	43	48.31%
Abdomen and skin infection	11	12.36%
Urinary tract infection	10	11.23%
Meningitis, seizure	10	11.23%
Viral hepatitis liver	6	6.74%
Respiratory tract infection	6	6.74%
unknown	2	2.25%
DM	1	1.12%

Out of 89 patients included for study, 75(84.27%) patients were prescribed Cephalosporin's, 17(19.11%) patients were prescribed with Penicillins, Followed by 14 (15.73%) patients were prescribed Nitroimidazole, 5(5.61%)patients were prescribed Fluoroquinolones,

13(14.60%) patients were prescribed aminoglycosides, 12(13.48%) patients were prescribed other antibiotics and 5(5.61%) patients were prescribed macrolide. Majority of the patients prescribed with penicillins may be having lesser adverse reactions (Table No.05).

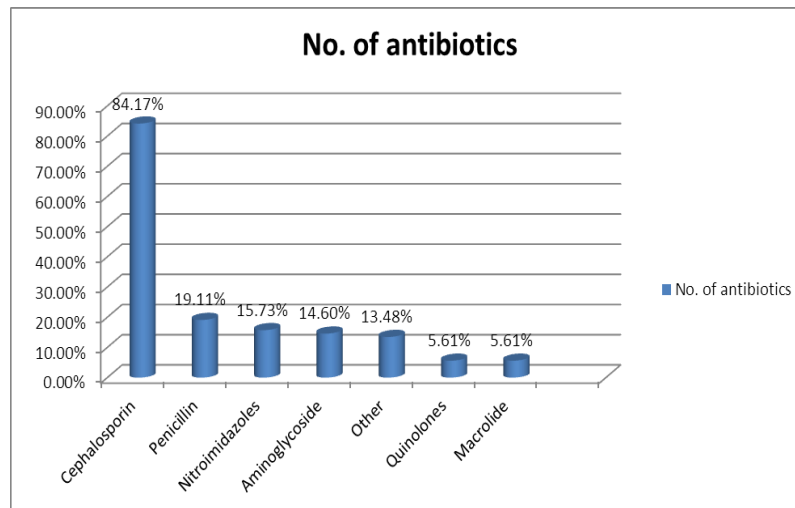


Fig. no: 05 Distribution of antibiotics according to class.

Table 05: Distribution of antibiotics according to class.

Class	No. of patients	Percentage %
Cephalosporin	75	84.27%
Penicillin	17	19.11%
Nitroimidazoles	14	15.73%
Quinolones	5	5.61%
Aminoglycoside	13	14.60%
Macrolide	5	5.61%
Other	12	13.48%

Table No 06: Distribution of antibiotics according to class.

Antimicrobial drug class	Individual antimicrobial	Monotherapy	Combination therapy	Drug utilization
Penicillin	Piperacillin/Tazobactam			17
	Ampicillin	1	5	
	Amoxicillin and clavulanate potassium	5	6	
Cephalosporins	Cefuroxime	1	25	75
	Ceftriaxone	41	4	
	Cefixime	1	2	
	Cefatoxime	1		
Macrolide	Azithromycin	1	3	5
	Clindamycin	1		
Aminoglycosides	Gentamicin	1		13
	Amikacin	12		
Nitroimidazoles	Metronidazole		14	14
Quinolones	Norfloxacin	1		5
	Ofloxacin	2		
	Levofloxacin	1		
	Moxifloxacin	1		
Other	Vancomycin	10		12
	Rifampicin	2		

Out of 89 study patient population most of them were under treatment with Ceftriaxone (n=66 with a

percentage of 74.16%), Amoxicillin + ClavulanicAcid23 (n=11 with percentage of 12.36%), Metronidazole

(n=14 with a percentage 15.73%), Piperacillin Tazobactam (n=6 with a percentage of 6.74%), Other antibiotics includes Vancomycin (n=10 with a percentage of 11.23%), Amikacin 12(13.48%), Gentamicin 1(1.12%) Cefuroxime1 (1.12%), Ampicillin

(1.12%) Cefatoxime3(3.37%), Cefixime5(5.62%), Norfloxacin1(1.12%), Levofloxacin1 (1.12%), Clindamycin 4(4.49%), Azithromycin1(1.12%), Moxifloxacin 1(1.12%), Ofloxacin 2(2.25%) Rifampicin 2(2.25%) find out (Table No: 07).

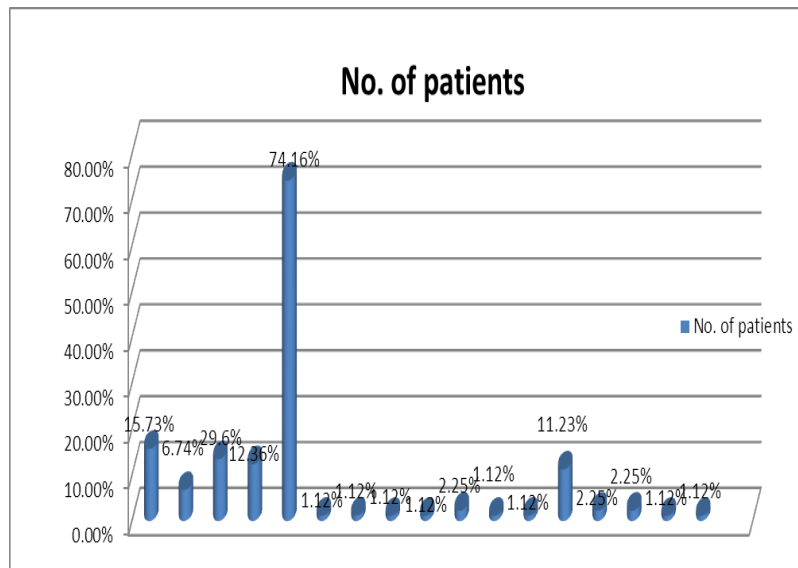


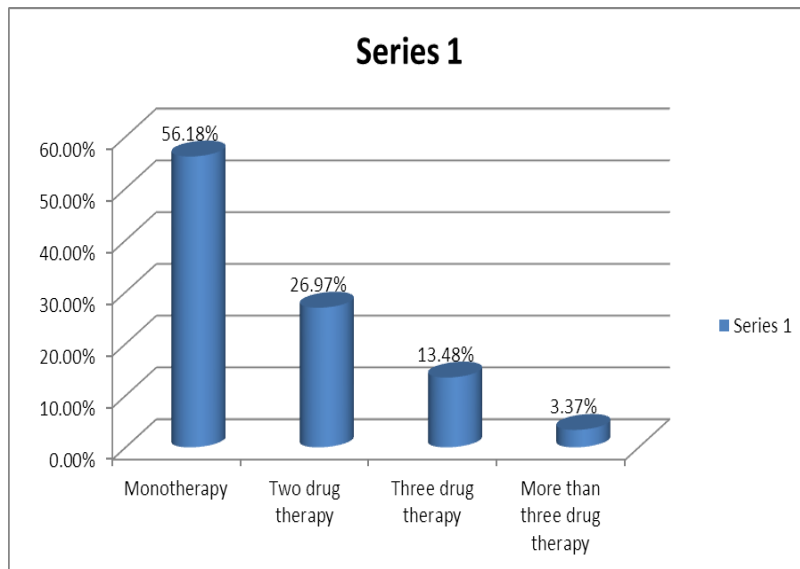
Figure: 07 Distribution of antibiotics in study population

Table no: 07 Distribution of antibiotics in study population.

Name of the antibiotics	No. of patients	Percentage %
Metronidazole	14	15.73%
Piperacillin/Tazobactam	5	6.74%
Amikacin	12	13.48%
Amoxicillin-clavulanate	11	12.36%
Ceftriaxone	66	74.16%
Cefuroxime	1	1.12%
Levofloxacin	1	1.12%
Clindamycin	1	1.12%
Cefatoxime	1	1.12%
Ofloxacin	2	2.25%
Moxifloxacin	1	1.12%
Azithromycin	1	1.12%
Vancomycin	10	11.23%
Rifampicin	2	2.25%
Gentamicin	1	2.25%
Cefixime	1	1.12%
Ampicillin	1	1.12%

Majority of the study participant were prescribed with more than two antibiotics or polypharmacy. Out of 89 prescriptions included for the study, 50 (9%) prescriptions were Monotherapy, 24 (33 %) prescriptions

were two drugs combinations, 12 (29 %) prescriptions were three drugs combinations, 3 (23%) prescriptions were more than three drug combinations (Table- 08).



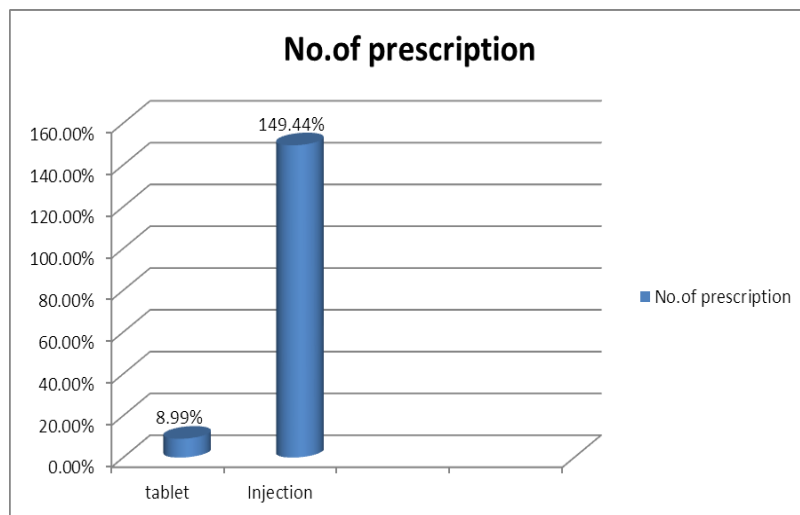
**Figure: 08: Pattern of use of antibiotics in paediatric patients during study period.**

**Table: 08: Pattern of use of antibiotics in paediatric patients during study period.**

Prescribing pattern	No. of prescription	% of prescription
Monotherapy	50	56.18%
Two Drugs Combination	24	26.97%
Three Drugs Combination	12	13.48%
More Than Three Drugs Combination	3	3.37%

In our study were also taken an account different antibiotic dosage forms used by the patient population Out of 89 prescriptions included for the study, most of the patients n=27(28.43%) were administered by oral

antibiotics. Followed by intravenous antibiotics n=66 (69.47%). and Followed by capsules n=2 (2.10%) (Table 6).



**Figure: 09 Dose form used in the study**

**Table: 09 Dose form used in the study**

Dose forms	No. of prescription	Percentage (%)
Oral	8	8.99%
Intravenous	133	149.44%

In our study the pediatrics departments as the need for antibiotic use were more in these departments. The antibiotics resistance is on the raise, there is a huge need

for taking steps to promote rational antibiotics use. It is necessary to take action to improve prescribing habits in

order to reduce the unnecessary usage of antibiotics thus enhance rational antibiotic use.

Out all patients 2 patients were the age of 0-28 days, 28 patients were the age of 28-2 years, 31 patients were the age of 3-11 years, 40 patients were the age of 12-18 years. Out of 89 patients included for study, 75(84.27%) patients were prescribed Cephalosporin's, 17(19.11%) patients were prescribed with Penicillins, Followed by 14 (15.73%) patients were prescribed Nitroimidazole, 5(5.61%) patients were prescribed Fluoroquinolones, 13(14.60%) patients were prescribed aminoglycosides, 12(13.48%) patients were prescribed other antibiotics and 5(5.61%) patients were prescribed macrolide .Majority of the patients prescribed with penicillins may be having lesser adverse reactions (Table No.05).

In our study, most of Peadiatric patients received antibiotics through parental route. Similarly, several studies have shown the varying percentages of antibiotics were prescribed parentally (Palikhe, 2004; Orrett *et al.*, 2010; Jason Hall, 2002; Sriram *et al.*, 2008; Shankar *et al.*, 2006 & Shamsy *et al.*, 2011).<sup>[14-19]</sup> Among the various groups of antibiotics, Cephalosporins (41.5%) were the most frequently prescribed antibiotics followed by Penicillin (35.5%), Aminoglycosides (20%), Macrolide (2%), Fluoroquinolones (1%) and Sulfonamide group (0.5%). Whereas, the study of Sriram *et al.* have shown 68.2% of Cephalosporins and 31.3% of Penicillins prescriptions. However, Sandra R Arnold in 1999 revealed that antibiotics from the penicillin class were the most frequently prescribed antibiotics and other categories of antibiotics prescribed include Aminoglycosides (8.9%), Macrolide (6.1%) Fluoroquinolones (4.7%) (Sriram *et al.*, 2008).<sup>[17]</sup> In our study, among the combination of antibiotics, Amoxicillin with Clavulanic acid and Ceftriaxone with Amikacin were found to be commonly prescribed antibiotics to peadiatric patients. In one of the study conducted in tertiary care hospital have found that the commonly used antibiotic combination were Cephalosporin with Aminoglycoside, Cephalosporin with Macrolide and Penicillin with Aminoglycosides (Sriram *et al.*, 2008).<sup>[17]</sup> Whereas, in another tertiary care hospital in Tamilnadu have shown the common combination of antibiotic were prescribed with Amoxicillin with Clavulanate, Piperacillin with Tazobactam, Cefotaxim with Sulbactam, Cefoperazone with Sulbactam, Ampicillin with Cloxacillin and Ceftriaxone with Tazobactam (Shamsy *et al.*, 2011)<sup>[19]</sup> and also in one of the study in child care centre of Moradabad city have found common antibiotics combinations of Cefpodoxime with Amikacin, Cefotaxim with Sulbactam, Amoxicillin with Clavulanic acid, Ceftriaxone with Vancomycin and Amoxicillin with Cloxacillin (Ashraf *et al.*, 2010).<sup>[20]</sup>

Out of 89 study patient population most of them were under treatment with Ceftriaxone (n=66 with a percentage of 74.16%), Amoxicillin + Clavulanic Acid 23 (n=11 with percentage of 12.36%), Metronidazole

(n=14 with a percentage 15.73%), Piperacillin Tazobactam (n=6 with a percentage of 6.74%), Other antibiotics includes Vancomycin (n=10 with a percentage of 11.23%), Amikacin 12(13.48%), Gentamicin 1(1.12%) Cefuroxime 1(1.12%), Ampicillin (1.12%) Cefatoxime 3(3.37%), Cefixime 5(5.62%), Norfloxacin 1(1.12%), Levofloxacin 1(1.12%), Clindamycin 4(4.49%), Azithromycin 1(1.12%), Moxifloxacin 1(1.12%), Ofloxacin 2(2.25%) Rifampicin 2(2.25%) find out (Table No: 07).

A prescription by a Doctor may be taken as an indication of the Doctor's attitude towards a disease and the role of drugs in its treatment 5,6. The most frequently prescribed antibiotic class observed in the study is Cephalosporins (84.26%) followed by the antiprotozoals (15.73%) and Aminoglycoside (14.60%).

## CONCLUSION

It is necessary to take action to improve prescribing habit in order to reduce the unnecessary usage of antibiotic thus enhance rational antibiotic use. The Drug and Therapeutic Committee can play an important role in this regard and also perform prescribing pattern studies and prescription reviews to improve drug use in general and management. The frequently prescribed antibiotics were Cephalosporins followed by Aminoglycoside and Nitroimidazole. In cephalosporin class, ceftriaxone usage were more common and also in combination with Amikacin. Prescription patterns and usage of antibiotics in this study were inappropriate because though it is acceptable to prescribe broad-spectrum antibiotics if a doctor thinks the clinical scenario warrants it. However, keeping in context the results of this study were recommend that the professional organizations should take up projects to increase the awareness about antibiotic use among the practicing physicians through systematic approach and latest information in order to check the emerging problem of antibiotic resistance

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